ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for June, 1890, as determined from observations taken daily at 8 a. m. and 8. p. m. (75th meridian time), is shown on chart ii by isobars. The departure of the mean pressure for June, 1890, obtained from observations taken twice daily at the hours named from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me	+.006	Duluth, Minn	—.001
Boston, Mass	+.008	Savannah, Ga	—.003
New York City	+.007	Saint Louis, Mo	—.006
Philadelphia, Pa	+.004	Galveston, Tex	—.012
Washington City	+.002	Fort Assinniboine, Mont	—.005
Buffalo, N. Y	+.002	Santa Fe, N. Mex	—.008
Detroit, Mich	+.001	Denver, Colo	—.003
Cincinnati, Ohio	+.006	Salt Lake City, Utah	—.008
Memphis, Tenn	+.004	Portland, Oregon	—.009
New Orleans, La	+.001	San Francisco, Cal	—.011
Chicago, Ill	+.001	San Diego, Cal	—.013

For June, 1890, the mean pressure was highest over the southern half of Florida, where it was above 30.10, the highest mean reading, 30.11, being reported at Tampa, Fla., and the mean values were above 30.05 over the east Gulf states and eastern Tennessee and along the immediate Pacific coast north of the fortieth parallel. The mean pressure was lowest over the southwestern part of the southern plateau region and at stations in the British Northwest Territory, where it was below 29.80, and the mean readings were below 29.90 from the southern plateau region northeastward over the middle Missouri and the Red River of the North valleys.

A comparison of the pressure chart for June, 1890, with that of the preceding month shows that there was an increase of pressure from the middle and north Pacific coasts southeastward over the plateau regions and thence eastward over the Gulf States, and from the lower Missouri and Red River of the North valleys eastward, save over southern and eastern New England and the Canadian Maritime Provinces. The most marked increase in pressure occurred from the Ohio Valley southward over the east Gulf states and thence westward to New Mexico, where it exceeded .05, and the greatest decrease was reported in the upper Missouri and Red River of the North valleys and in the British Possessions to the northward, where it was more than .05. The increase in pressure over the southeastern part of the country attended the formation of an area of high pressure over southern Florida; the decrease in pressure over the north-central part of the country attended the development of an area of low pressure over the British Northwest Territory; and there was a decrease in pressure of about .05 over the southeastern part of the southern plateau region.

The mean pressure was above the normal, save over the central and north-central parts of the country, and over the southeastern part of the southern plateau region. At stations along the Atlantic coast north of the thirty-fifth parallel the mean pressure corresponded with the normal. The greatest departures above the normal pressure were noted over southern Florida and along the west Gulf coast, in the Saint Lawrence Valley and New Brunswick, and in northwestern California, where they exceeded .05, and the most marked departures below the normal pressure occurred in the middle Missouri valley, where they were more than .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In June, 1890, the monthly ranges were greatest in the middle Missouri valley, where they exceeded 1.00, whence they decreased eastward to less than .60 in New England, southeastward to less than .30 over southern Florida, southward to .30 on the west Gulf coast, southwestward to less than .20 over the southeastern part of the southern plateau region, and to less than .30 on the south Pacific coast, and westward to less than .40 on the middle Pacific coast, and to .60 on the north Pacific coast. Along the Atlantic coast the monthly ranges varied from .28 at Key West, Fla., to .66 at Eastport, Me.; between the eighty-second and ninety-second meridians, .29 at Vicksburg, Miss., to .79 at Dubuque, Iowa; between the Mississippi River and the Rocky Mountains, .30 at Galveston, Tex., to 1.02 at Fort Sully, S. Dak.; in the Rocky Mountain and plateau regions, .19 at Fort Grant, Ariz., to .72 at Fort Assinniboine, Mont.; on the Pacific coast, .25 at Los Angeles, Cal., to .69 at Port Angeles, Wash.

Chart ii shows that in June, 1890, there was a range in mean pressure of .32 from southern Florida to the western part of the southern plateau region; a range of .18 from the Colorado River to the south Pacific coast; and a range of .31 from stations in the British Possessions north of the upper Missouri valley to the north Pacific coast.

AREAS OF HIGH PRESSURE.

Five areas of high pressure were observed within the limits of the United States during the month of June, three of which originated on the Pacific coast, and after remaining almost stationary in that region from two to five days passed east of the Rocky Mountains, and two of the three continued their easterly course to the Atlantic coast, while one disappeared on the eastern slope of the Rocky Mountains. Two of the areas of high pressure observed first appeared north of the Lake region and passed southeastward to the Atlantic, one of which apparently separated upon reaching the coast, one portion of the high area passing southeastward to the Florida coast, while the other passed northeastward over the Maritime Provinces. The following is a general description of the atmospheric conditions attending each area of high pressure:

I.—The month opened with an area of high pressure north of the Lake region, this condition being a continuation of the area of high pressure observed at the close of the previous month. Generally fair weather continued over the regions east of the Mississippi during the 1st and 2d, while this area drifted to the southeastward, causing a moderate and general increase of pressure along the entire Atlantic coast. On the morning of the 3d the barometer was highest near eastern New York, after which a portion of this area apparently moved northeastward over the lower Saint Lawrence valley, while at the same time there was a slight increase of pressure along the south Atlantic coast, the directions of the wind indicating a southerly movement of this secondary area which was central off the Florida coast on the 5th, and traces remained of this condition in that vicinity on the 6th. That portion of this area which passed northeastward passed over Nova Scotia and was traced to the eastward of that region on the 5th.

II.—Was also observed on the 1st, central to the west of central California. It moved slowly northward, following the coast line, and extending over the Pacific coast states from the 1st to the 4th when it reached its most northerly latitude west of Washington, from which region it passed directly eastward, crossing the Rocky Mountains during the 5th, the direction of movement being to the southeastward during the 6th and 7th, when it covered the western half of the United States, the centre reaching its most southerly limit while passing over Kansas, where the direction of movement again changed to the north of east. On the morning of the 8th this area covered the eastern portion of the United States, attended by generally clear weather, the centre being over Lake Erie, after which its course again changed to the southeast, the area covering the entire Atlantic coast, the centre of greatest pressure passing over the middle Atlantic states and thence southward off the south Atlantic coast, where it continued until the 11th.

III.—Appeared off the north Pacific coast on the 11th and continued almost stationary in that region from the 11th to the 15th, when it passed to the northern Rocky Mountain region, attended by marked decrease of pressure as compared with that observed while on the Pacific coast, and although poorly defined its movements were traced eastward over the central valleys during the 17th and over the upper lake region on the 18th, where it was apparently re-enforced from the Hudson Bay region, causing it to move southeastward over the lower lake region and the middle Atlantic states, passing to the east of the coast line during the night of the 20th, and disappearing wholly from the field of observation during the 21st. It may be observed that the two areas of high pressure which passed from the Pacific to the Atlantic passed over almost identically the same course, the direction of movement being to the north of east while on the Pacific coast and while approaching the Lake region, and to the south of east in passing over the Rocky Mountain regions and from the Lake region towards the Atlantic coast.

IV.—Appeared to the north of the Saint Lawrence Valley on the 14th, while the area of high pressure previously described was central on the north Pacific coast. It passed directly south to the Saint Lawrence Valley, and thence southeastward over New England, the maximum pressure occurring along the New England and Nova Scotia coasts on the 16th, after the centre had passed to the east of the coast line. It apparently drifted southward from the New England coast but could not be located after the 17th.

V.—Was clearly defined as central off the north Pacific coast on the 25th, although the previous reports indicate that it doubtless reached that location from the southwestward, reports from the Pacific coast as early as the 22d indicating the advance of an area of high pressure from that region. This area remained almost stationary on the north Pacific coast until the 27th, when its centre reached the forty-ninth parallel, when it extended rapidly to the southeastward, attended, however, by a marked decrease of pressure. It extended over the Rocky Mountain and plateau regions during the 28th and 29th, and at close of month there was a slight trace of it remaining over the east-central slope of the Rocky Mountains.

AREAS OF LOW PRESSURE.

Eight areas of low pressure were observed during the month of June. Compared with the previous month the weather changes have been less marked, less rapid, and there has also been a decided decrease in the number of areas of high and low pressure. No well-defined storm passed over the country south of the Lake region, no area of low pressure reached the Atlantic coast south of New York, and the region of greatest storm frequency was transferred from the lakes to the central Rocky Mountain region, and only one well-defined storm passed eastward from the Pacific coast, and that disappeared north of North Dakota.

The following is a general description of the weather conditions observed during the transit of each area of low pressure:

I.—On the first of the month the plateau and Rocky Mountain regions were included within an extended barometric depression which existed at the close of the previous month. This storm was central near Salt Lake City, Utah, at the a. m. report of the 1st, and on the succeeding day it passed eastward to Colorado, attended by high winds and severe local storms in the Dakotas and generally throughout the Northwest. These conditions continued during the 3d and 4th, the storms extending over the Lake region with considerable violence, while the centre remained in the Missouri Valley near Huron, S. Dak. The rainfall was especially heavy in the upper Mississippi and Missouri valleys. The gales were very severe on Lake Michigan, and the high winds were destructive to crops in Minnesota, the Dakotas, and Nebraska. This storm apparently developed its maximum intensity while passing eastward over Minnesota. It reached the east portion of Lake Superior on the morning of the 6th, and continued its course to the Saint Lawrence Valley during the 7th, disappearing to the east of the Maritime Provinces during the night of the 8th. During the passage of this storm only light showers occurred on the Atlantic coast, and winds of moderate force were observed as far south as Hatteras, N. C.

II.—This storm apparently developed on the west Gulf coast on the 8th, and pursued an unusual course, passing directly north over the Mississippi Valley, reaching the vicinity of Saint Paul, Minn., on the morning of the 10th, where the direction of movement changed abruptly to east, carrying this storm directly over the upper lake region and thence to the upper Saint Lawrence valley, where it remained almost stationary for forty-eight hours, developing but slight energy, attended by an apparent southeasterly movement which could not be traced definitely after the morning of the 14th, but it apparently passed off the south New England coast.

III.—When the preceding storm was central in the lower Mississippi valley this disturbance appeared to the north of Montana, and during the 9th the two depressions apparently approached each other, one moving northward over the upper Mississippi valley, and the other extending southward over the Rocky Mountain region. After reaching western Kansas during the 10th it disappeared by gradual decrease of pressure and could not be traced beyond that region.

IV.—Apparently developed over Montana on the 11th, and after passing eastward to the Dakotas two disturbances formed, one passing to the Missouri Valley near Omaha, Nebr., and the other appearing far to the north of North Dakota on the morning of the 13th. The disturbance in the Missouri Valley divided during the 13th, the principal disturbance passing over Iowa, while the secondary moved southward over Kansas, and disappeared during the 14th. The principal disturbance after reaching the vicinity of Saint Paul, Minn., apparently united with the one previously noted as central to the north of North Dakota, and could not be traced from the telegraphic reports after the morning of the 15th. Although this storm did not move to the east of the Mississippi, it was immediately followed by heavy local rains in the Ohio Valley.

V.—This disturbance developed over northern California on the 16th and was preceded by a slight disturbance in Colorado on the 15th, which is not traced on chart i. It passed northeastward to the northern plateau region on the 17th, and thence southeastward to the central Rocky Mountain region on the 18th, where it remained almost stationary until the afternoon of the 19th, attended by heavy local rains from Texas northward to the Dakotas. These rains extended eastward to the upper lake region on the 20th when the centre of disturbance passed to North Dakota. The rainfall attending this storm in northwest North Dakota was especially heavy over a region which had been previously suffering from drought, the previous seasonal rainfall in that section being about 35 per cent. of the normal, while the recent rains have brought the seasonal rainfall up to more than 90 per cent. This storm disappeared to the north of Minnesota on the 21st.

VI.—Was first observed north of the Saint Lawrence Valley, and although it had but slight influence on the weather conditions of the United States, the telegraphic reports indicate that it passed southward to the Maine coast and thence southeastward off the Nova Scotia coast during the 18th and 19th. It was a disturbance of slight energy, although well defined, but the general rains attending it did not extend as far south as Portland, Me., nor to the westward of Quebec, Quebec.

VII.—This storm developed over the central Rocky Mountain region on the 21st and probably within the southern extremity of the barometric trough which attended the disturbance traced as number v. It covered the greater portions of the plateau and Rocky Mountain regions on the 22d, and remained almost stationary in this section until the 25th, with an apparent tendency, however, to move to the northward. It was attended by generally fair and warm weather throughout the central valleys, although local rains and thunderstorms occurred in the Northwest on the 23d and 25th, and

in the Lake region on the 26th. This disturbance passed to the north of Minnesota, but the centre could not be located after the 26th.

VIII.—Appeared far to the north of the lower lake region on the 24th, and passed directly southeastward to the New England coast during the succeeding twenty-four hours. It was attended by light rains and thunder-storms in New England during the 25th and remained practically stationary over Nova Scotia from the 25th to the 28th without causing any marked disturbance.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum abnormal changes in pressure in twelve hours, with maximum abnormal changes in temperature and maximum wind velocities in connection therewith.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Rise.	Station.	Date.	Fall.	Station.	Date.	Miles per hour.	Direction.	Station.	Date
High areas.		°	°	°	°	*Days.*	*Miles.*	*Inch.*			°						
I	*30	54	108	45 / 26	56 / 78	6.0 / 7.0	22 / 20	.42	Swift Current, N. W. T.	*29	27	Chicago, Ill	*31	40	ne.	Fort Buford, N. Dak	*31
II	1	37	126	30	76	10.0	20	.42	Rockliffe, Ont	7	26	Montrose, Colo	3	54	n.	Galveston, Tex	6
III	11	42	128	40	71	10.0	18	.36	Rapid City, S. Dak	13	24	Duluth, Minn	16	60	nw.	Detroit, Mich	17
IV	14	52	77	37	69	2.5	23	.20	Chatham, N. B	15	8	Eastport, Me	16	52	nw.	Hatteras, N. C	15
V	25	43	127	40	104	5.5	14	.38	Calgary, N. W. T	30	24	Santa Fé, N. Mex	25	48	n.	Valentine, Nebr	28
Mean	....	46	113	36	76	6.8	20	.36		....	22		....	51			....
Low areas.								Fall.			Rise.						
I	1	41	112	48	52	7.0	20	.30	Winnipeg, Man	1	17	Marquette, Mich	5	66	sw.	Fort Sully, S. Dak	4
II	8	28	96	44	75	5.0	21	.30	Montreal, Quebec	10	15	Fort Sully, S. Dak	10	39	w.	Harrisburg, Pa	12
III	8	54	112	37	101	2.0	30	.40	Swift Current, N. W. T.	8	22	Swift Current, N. W. T.	8	76	nw.	Fort Assiniboine, Mont.	9
IV	11	47	107	52 / 45	97 / 92	3.5 / 3.0	14 / 15	.26	Concordia, Kans / Qu'Appelle, N. W. T	12 / 11	23	Pueblo, Colo	12	56	w.	do	13
V	16	40	122	53	97	5.0	21	.36	Fort Sully, S. Dak	17	26	Spokane Falls, Wash	15	52	w.	do	21
VI	17	53	67	44	63	1.5	24	.28	Montreal, Quebec	17	14	Father Point, Quebec	16	48	e.	Father Point, Quebec	18
VII	21	39	104	51	99	5.0	9	.34	Fort Custer, Mont	24	19	Denver, Colo	22	70	se.	Yankton, S. Dak	23
VIII	24	50	76	43	60	4.0	12	.22	Halifax, N. S	22	10	Block Island, R. I	25	34	nw.	New York City	26
Mean	....	44	99	46	82	4.0	18	.31		....	18		....	55			....

*May.

NORTH ATLANTIC STORMS FOR JUNE, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic ocean during June, 1890, are shown on chart i. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Ten depressions have been traced for the current month, four of which were continuations of areas of low pressure which first appeared over the North American continent, two developed over or near Newfoundland, one about midway between Newfoundland and the Azores, and three to the westward or northwestward of the British Isles. The depressions generally pursued normal east to northeast paths, and no storms traversed the ocean from coast to coast. Compared with the storms traced for June during the last seven years, the depressions noted for the current month, while exceeding in number the average for the period named, were deficient in energy, and gales of unusual strength were not encountered along the trans-Atlantic steamship routes.

The month opened with a depression central on the west coast of Newfoundland, where the pressure fell to about 29.55 (749), and a second depression was central northeast of the Grand Banks. During the 2d and 3d the depression first referred to moved slowly northeastward over Newfoundland, with an apparent slight increase in pressure, and by the 4th had advanced eastward over mid-ocean near the fiftieth parallel, after which it probably moved northeastward beyond the region of observation. During the 2d and 3d the pressure fell rapidly to the west of the British Isles, and on the latter-named date fresh to strong gales and pressure falling to about 29.40 (747), were reported off the Irish coast, and on the 4th a depression of considerable strength was central northwest of Ireland. From the 8th to 10th a depression which was a continuation of low area i moved from the Gulf of Saint Lawrence northeastward over Newfoundland, after which it apparently recurved to the southward and united with a depression which was central on the 11th south of Newfoundland. From the 9th to 11th fresh to strong gales prevailed east of the twenty-fifth meridian under the influence of a depression which first appeared east of the Grand Banks on the 4th, and moved thence northeastward north of the fifty-fifth parallel by the 9th, whence it passed southeastward to Ireland by the 11th, and thence eastward over the British Isles. From the 11th to 13th a depression advanced from south of Newfoundland east-northeast to mid-ocean, with pressure falling to or below 29.50 (749), and fresh to strong gales over mid-ocean on the latter-named date, after which it disappeared north of the region of observation. On the 15th a depression, which was probably a continuation of low area ii, was central on the south coast of Newfoundland, whence it moved east-northeast, and on the 17th was attended over mid-ocean by fresh to strong gales and pressure falling to about 29.40 (747), after which it disappeared north of the region of observation. From the 19th to the 21st a depression, which was a continuation of low area vi, moved east-northeast from south of Nova Scotia to the fiftieth parallel, attended by fresh to strong gales, after which it disappeared north of the region of observation. From the 25th to 29th fresh to strong gales and pressure varying from 29.50 (749) to 29.90 (754) attended the passage of low area viii which advanced from the Saint Lawrence Valley to the New England coast, thence eastward to Nova Scotia, over and south of which province it pursued an irregular course until the evening of the 28th, and thence northeastward over Newfoundland as depression number 9 during the 29th and 30th. On the 25th a depression was central south or southeast of Iceland, whence it moved eastward and disappeared north of the British Isles after the 26th. During the 29th and 30th a depression of considerable energy moved southeastward west of British Isles, and on the latter-named date was attended by pressure falling to about 29.40 (747) and fresh to strong gales.

Reports of the last seven years show that severe storms seldom occur in the tropical or sub-tropical regions of the north Atlantic ocean or over the Gulf of Mexico in June, and that in 1886 and 1889 only were depressions of marked strength